

WHAT IS CLAIMED IS:

1. An at least partially implantable hearing assistance system, comprising:  
a vibrator including a mount, adapted to be secured to a middle ear and a  
5 piezoelectric transducer film, carried by the mount, proportioned to be mechanically  
coupled to the middle ear and to vibrate the auditory element in response to an  
electrical input signal;  
an electronics unit, electrically coupled for providing the electrical input  
signal to the vibrator; and  
10 a programmer, adapted for communicative coupling to the electronics unit.
2. The system of claim 1, in which the film is secured at a plurality of  
constraint points.
- 15 3. The system of claim 2, in which the film is secured to transform longitudinal  
variations in a physical dimension of the film into vibrations of the auditory  
element.
4. The system of claim 2, in which the film has a hoop shape.
- 20 5. The system of claim 2, in which the film has a substantially straight length.
6. The system of claim 2, in which the film has a bow shape.
- 25 7. The system of claim 2, further comprising first and second arms, each  
extending radially outward from the mount and mechanically coupled to the film.
8. The system of claim 2, in which the film comprises polyvinylidene fluoride.

9. The system of claim 2, in which the piezoelectric transducer film is mechanically coupled to the mount at first and second constraint points, and having between the first and second constraint points at least one driving point on the film coupled to an auditory element at the driving point such that a variation in a film length between the first and second constraint points is transformed into an approximately orthogonal variation in position of the driving point for vibrating the auditory element.
10. The system of claim 2, in which the film is a bi-element transducer film.
11. An at least partially implantable hearing assistance system, comprising:  
an electromechanical sensor, including a mount adapted to be secured to a middle ear, and a piezoelectric transducer film carried by the mount, in which the film is proportioned for mechanically coupling to an auditory element in the middle ear, and the film is adapted for receiving vibrations from the auditory element and producing a resulting output voltage in response to the vibrations;  
an electronics unit, electrically coupled for providing the electrical input signal to the vibrator; and  
a programmer, adapted for communicative coupling to the electronics unit.
12. The system of claim 11, in which the resulting output voltage is produced across a thickness of the film and provided to an electronics unit.
13. The system of claim 11, in which the film is secured at a plurality of constraint points.
14. The system of claim 11, in which the film is secured to transform vibrations of the auditory element into longitudinal dimensional variations of the film.

15. The system of claim 11, in which the film has a hoop shape.
16. The sensor of claim 11, in which the film has a substantially straight length.
- 5 17. The sensor of claim 11, in which the film has a bow shape.
18. The sensor of claim 11, further comprising first and second arms, each extending radially outward from the mount and mechanically coupled to the film.
- 10 19. The sensor of claim 11, in which the film comprises polyvinylidene fluoride.
20. The sensor of claim 11, in which the film is coupled at a vibrated point to an auditory element within the middle ear, and mechanically coupled to the mount at first and second constraint points such that vibrations received from the auditory
- 15 element at the vibrated point produce a variation in a longitudinal direction of the film which in turn produces a resulting output voltage.
21. The sensor of claim 20, in which the resulting output voltage is produced across a thickness of the film and provided to an electronics unit.
- 20 22. The sensor of claim 11, in which the film is a bi-element transducer film.